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### Permalink

<https://escholarship.org/uc/item/13t014gb>

### Journal

Alcohol and Alcoholism, 50(4)

### ISSN

0735-0414

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### Publication Date

2015-07-01

### DOI

10.1093/alcalc/agv021

Peer reviewed

Article

# Receiving Versus Being Denied a Pregnancy Termination and Subsequent Alcohol Use: A Longitudinal Study

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Received 24 October 2014; Revised 20 February 2015; Accepted 23 February 2015

## Abstract

**Aim:** Research finds women who terminate pregnancies are at risk of subsequent problematic alcohol use, but methodological and conceptual problems are common. This study examines the relationship between receiving versus being denied termination and subsequent alcohol use.

**Methods:** Data are from a prospective, longitudinal study of US women seeking pregnancy terminations. Participants presented just before a facility's gestational limit and received terminations (*Near Limits*,  $n = 452$ ) or just beyond the limit and were denied terminations (*Turnaways*,  $n = 231$ ).

**Results:** Groups did not differ in alcohol use before pregnancy recognition. One week after termination-seeking (*Turnaways* still pregnant, *Near Limits* not), *Turnaways* had lower odds of any and binge alcohol use, but did not differ on 1+ problem symptoms. Over 2.5 years, both *Near Limits* and *Turnaways* increased any and binge alcohol use, with *Turnaways* increasing more rapidly. The groups did not converge again on any or binge use. For *Near Limits*, any alcohol use surpassed the pre-pregnancy recognition level, but binge use did not. Changes in problem symptoms over time were not evident for either group.

**Conclusion:** While women who had a termination were more likely to report any and binge alcohol use than women who had a child, this difference was due to a reduction in consumption among women having the child rather than an increase in consumption among women having a termination. Thus, assertions that having a termination leads women to increase alcohol use to cope with having had a termination are not supported.

## INTRODUCTION

Some previous research finds higher levels of alcohol use and alcohol use disorders among women who have had pregnancy terminations (Major *et al.*, 2009; Steinberg and Finer, 2011). This higher level among women having terminations has been attributed to something

about the termination, with some researchers describing pregnancy termination as a stressful or traumatic event that results in poor mental health outcomes, including alcohol use disorders (Coleman *et al.*, 2002, 2005; Pedersen, 2007; Major *et al.*, 2009). Such arguments have been used to discourage women from terminating pregnancies (Bryant and Levi, 2012).

Attributing higher levels of alcohol use subsequent to pregnancy termination to the termination may be inaccurate, as this attribution disregards the possibility that consuming more alcohol before pregnancy may be associated with deciding to terminate an unintended pregnancy (Roberts *et al.*, 2012; Keenan *et al.*, 2014). Research that assesses alcohol consumption prior to the decision to terminate and controls for factors associated with both the decision to terminate and subsequent consumption is thus essential to disentangle the relationship between termination and subsequent consumption. Studying alcohol consumption among women with unwanted pregnancies—in this case, defined as pregnancies they sought, but were not necessarily able, to terminate—is one strategy that can take into account factors that may have led women to decide to terminate a pregnancy.

The attribution of higher levels of alcohol consumption subsequent to pregnancy termination to the termination itself also disregards well-documented reductions in consumption that occur during pregnancy and are often sustained to some extent during the postpartum period and beyond (Fried *et al.*, 1985; O'Connor *et al.*, 1986; Little *et al.*, 1990a; Forrest *et al.*, 1991; Bolumar *et al.*, 1994; Gilchrist *et al.*, 1996; Hellerstedt *et al.*, 1998; Kost *et al.*, 1998; Lopez *et al.*, 1998; Pirie *et al.*, 2000; Jacobson *et al.*, 2002; Ockene *et al.*, 2002; O'Connor and Whaley, 2003; Chambers *et al.*, 2005; Chasnoff *et al.*, 2005; Alvik *et al.*, 2006a, 2006b; Tough *et al.*, 2006; Palma *et al.*, 2007; Bailey *et al.*, 2008; Harrison and Sidebottom, 2009; Crozier *et al.*, 2009; Ethen *et al.*, 2009; Spears *et al.*, 2010; Massey *et al.*, 2011). It is thus possible that studies finding more alcohol consumption subsequent to termination may be picking up a reduction associated with pregnancy and parenting rather than an increase among women having a termination (Pedersen, 2007; Major *et al.*, 2009). Longitudinal studies that allow examination of changes in alcohol use over time can shed light on these questions.

There is also a robust body of research about alcohol use and the transition to parenting. This literature and the literature on pregnancy termination and subsequent alcohol consumption have mostly not been considered together. This robust body of research finds the transition to parenting is associated with reductions in alcohol consumption among women (Chilcoat and Breslau, 1996; Hajema and Knibbe, 1998; Ahlstrom *et al.*, 2001; Christie-Mizell and Peralta, 2009; Paradis, 2011). This parenting-related reduction has been attributed to the parenting-role and explained by social roles theory, i.e. that parenting is associated with less time to consume alcohol because of caregiving responsibilities and with more fulfillment due to performing multiple roles and thus lower motivation to drink (Chilcoat and Breslau, 1996; Hajema and Knibbe, 1998; Cho and Crittenden, 2006; Leonard and Eiden, 2007; Staff *et al.*, 2010). Studying alcohol consumption among women who have children from unwanted pregnancies can shed light on whether parenting-related reductions reflect characteristics of women who select a parenting-role or whether this reduction is caused by parenting.

To contribute to the literature on pregnancy termination and subsequent alcohol use, as well as on parenting and alcohol use, this paper examines the relationship between receiving versus being denied a pregnancy termination and trajectories of alcohol consumption from one week through two and one-half years after seeking termination. This paper uses data from the Turnaway Study, a prospective cohort study that compares physical and mental health and socioeconomic well-being among women seeking pregnancy termination, some of whom received the termination and others denied the termination because they presented beyond the gestational age limit for termination at the facility where they were recruited. The fact that gestational age limits for providing terminations vary across facilities presents an

opportunity for a natural experiment in which women receiving terminations just under a facility's limit can be compared with women denied terminations because they sought care just after a limit.

## METHODS

### Data source

Details about the Turnaway study design have been published previously (Gould *et al.*, 2012; Upadhyay *et al.*, 2014; Dobkin *et al.*, 2014; Roberts *et al.*, 2014a). Briefly, the Turnaway Study recruited participants between January 2008 and December 2010 from 30 facilities located throughout the US that provided pregnancy termination care. Potential participants were English- and Spanish-speaking women aged 15 or older, with no known fetal anomalies or demise, presenting at a participating facility within the gestational age range of one of three study groups. Study groups were: (a) *Near Limit Termination Group*: women presenting for termination within two weeks under a facility's gestational age limit for providing termination and who received a termination; (b) *Turnaways*: women presenting up to three weeks over a facility's limit and denied a termination; (c) *First Trimester Termination Group*: women under the gestational limit, in their first trimester, and receiving a termination. *First Trimesters* were included because *Near Limits* received terminations later in gestation than is typical in the US, where 90% of terminations occur in the first trimester (Pazol *et al.*, 2012). The three study groups were recruited in a 2:1:1 ratio. We recruited twice as many *Near Limits* because we anticipated that relatively fewer women would meet criteria for *Turnaways* and we wanted to ensure an adequate sample.

Recruitment facilities were selected because they had the latest gestational limit for providing terminations within 150 miles. Participating facilities had limits from 10 weeks through the end of the second trimester. They were identified using the National Abortion Federation directory and contacts within the pregnancy termination research community. Of facilities selected, all but two agreed to participate. One that refused to participate was replaced with a facility with an identical gestational limit, the same catchment area and similar patient volume. Gestational limits vary across facilities due both to state-level restrictions and to provider factors (e.g. training, institutional limits, staff preferences).

### Participation

Thirty-seven and a half percent ( $n = 1132$ ) of eligible participants recruited consented to participate. Of those who consented, 85% ( $n = 956$ ) participated in the baseline interview. The two main study groups (*Near Limit* and *Turnaway*) did not differ in participation rates, although fewer women eligible for *First Trimesters* participated (Dobkin *et al.*, 2014). Of the 956, 452 were *Near Limits*, 231 *Turnaways* and 273 *First Trimesters* at one facility with a 10-week gestational limit, more than 90% of *Turnaways* received a termination elsewhere subsequent to being turned away. All participants from this facility ( $n = 76$ ) were removed from analyses. Three additional participants (two *Near Limit* and one *First Trimester*) later reported that they had not had the termination and were excluded from analyses. The final sample included 413 *Near Limit*, 210 *Turnaways* (50 of whom had a termination or miscarriage subsequent to being turned away) and 254 *First Trimesters*.

### Data collection

The Turnaway Study collected data through semi-annual telephone interviews, following participants for five years. The first interview

(baseline) took place one week after termination-seeking. The analyses presented here report on findings from the first six interviews: baseline, 6-month, 12-month, 18-month, 24-month and 30-month interviews. Thirty-month interviews were completed in July, 2013.

## Measures

Outcome variables included *alcohol use* (dichotomous, any alcohol use), *binge alcohol use* (dichotomous, more than five drinks at a time) and *potential problem symptom* (dichotomous, either an eye-opener or a blackout or both). All referred to past month use. The eye-opener question asked, ‘. . . did you ever have a drink first thing in the morning to steady your nerves or get rid of a hangover?’ The blackout question asked, ‘. . . were you ever unable to remember what happened the night before because you had been drinking?’ At baseline, women were asked about drinking in the past month and in the month before pregnancy recognition.

The main independent variables included study group, time and interactions between study group and time. *Study Group* was categorical: *Near Limits* were the reference; *Turnaway Births* refers to *Turnaways* with a live birth, including 15 who placed their baby for adoption; *Turnaway No Births* refers to *Turnaways* who miscarried or received a pregnancy termination elsewhere; and *First Trimesters*. *Near Limits* were chosen as the reference to be able to simultaneously compare experiences of *Turnaway Births* and *Near Limits* as well as *First Trimesters* and *Near Limits*. *Months* was a continuous variable of months from recruitment. *Study Group* × *Months* interaction terms refer to group-specific trajectories in alcohol use.

Covariates included *age*, in years; *race* (White, Black, Hispanic/Latina, Other); *parity/recent births* (nulliparous; past year birth; 1, no past year birth; 2+, no past year birth); *union status* (single, married, cohabiting, divorced/separated); *education* (less than high school, high school or GED, some college, college graduate); *employed* (either full- or part-time versus not employed); *child abuse/neglect* (physical abuse, neglect and/or sexual abuse during childhood); and *history of depression/anxiety* (previous depression or anxiety diagnosis).

## Retention

Of participants who completed the baseline interview, 92% were retained at 6 months and 72% at 30 months. There was no differential loss-to-follow-up among study groups or by pre-pregnancy recognition binge alcohol use or problem symptoms. More women who consumed alcohol than women who abstained prior to pregnancy recognition (76 vs. 69%) participated in the 30 month interview.

## Analysis

Analyses were conducted with Stata 13.0. Differences in baseline characteristics across study groups were analyzed using mixed effects linear, logistic, ordinal logistic and multinomial logistic regression. Statistical models accounted for clustering within facilities.

Longitudinal analyses examining associations between study group and changes in alcohol consumption over time were conducted with mixed effects logistic regression. Longitudinal analyses used all available data from the first six interviews. Alcohol consumption reported one week after termination-seeking was the first timepoint. Baseline covariates were centered. Random intercepts for facility and for individual were included to account for clustering. Random coefficients for individuals (to allow for differential change over time across individuals) were also included, as they improved model fit. Quadratic terms for time (allowing for non-linear change over time) also improved model fit and were retained. Models adjusted for covariates

expected to influence alcohol use during and after pregnancy as well as baseline covariates that differed at  $P < 0.10$  between *Near Limits* and any other group. Gestational age was not included in models because, by study design, it determined study group.

Graphs of the population-average predicted probability based on model output were used to visualize model output when interaction terms were statistically significant.

Finally, we conducted sensitivity analyses. First, we excluded women who placed their babies for adoption from *Turnaway Births* and included them with *Turnaway No Births*, creating *Turnaway Parent* versus *Turnaway No Parent* groups. Second, we excluded facilities with participation rates below 50% in order to assess the possibility of selection bias in sites with lower participation.

## RESULTS

### Sample description

The sample was diverse, with about one-third White, one-third Black and one-fifth Latina [See Table 1]. At baseline, the mean age was 24.9. Almost two-thirds had had a previous live birth, with slightly more than 10% having a birth the prior year. Almost two-thirds were single, with a little less than 10% married. Slightly less than half had some education beyond high school. About one-fourth reported experiencing child abuse or neglect and a similar proportion reported a history of depression/anxiety. A little less than half (45%) abstained from alcohol the month before pregnancy recognition, with about ¼ binge drinking, and 6% reporting one or two problem symptoms.

Study groups were mostly similar. Compared with *Near Limits*, *Turnaway Births* were younger and more likely to be nulliparous; fewer *First Trimesters* were Other race/ethnicity; *Turnaway No Births* were less likely to report a history of child abuse/neglect. As expected due to study design, groups differed on gestational age, with *Turnaway Births* three weeks later in gestation, *Turnaway No Births* one week earlier and *First Trimesters* 12 weeks earlier than *Near Limits*. The only statistically significant difference in alcohol consumption prior to pregnancy recognition was between *First Trimester* and *Near Limits*, with more *First Trimesters* reporting any alcohol use before pregnancy recognition.

### Longitudinal analyses

Results of longitudinal analyses are in Table 2 and shown graphically in Figs 1 and 2. The adjusted odds ratio (aOR) for Study Group indicates the extent to which alcohol consumption at baseline for each study group differed from *Near Limits*. Change over time for *Near Limits* is indicated by months; the  $P$ -value for months indicates whether the slope of change over time statistically differed from zero. Study Group-by-Time interactions indicate whether and how much change over time differed for that study group versus *Near Limits*.

While there were no statistically significant differences in any alcohol use before pregnancy recognition, *Turnaway Births* had lower odds than *Near Limits* of any alcohol use one week after termination-seeking ( $P < 0.001$ ), when *Turnaway Births* were still pregnant (Table 2 and Fig. 1). Odds of any alcohol use among *Near Limits* increased from one week through 30 months ( $P < 0.001$ ), although use stopped increasing by 18 months. Odds of any alcohol use among *Turnaway Births* increased more rapidly than among *Near Limits* ( $P = 0.001$ ), and, similar to *Near Limits*, stopped increasing by 18 months. Figure 1 shows that the difference in any alcohol use between *Near Limits* and *Turnaway Births* narrowed from one week to 30 months after termination-seeking, but did not converge.

**Table 1.** Sample and study group descriptions

	Total <i>n</i> = 877	Near Limit Group <i>n</i> = 413	Turnaway Births <i>n</i> = 160	Turnaway No Births <i>n</i> = 50	First Trimester Group <i>n</i> = 254
Age (mean)	24.9	24.9	23.4**	24.4	25.9*
Race/ethnicity					*
White	33	32	25	42	39
Black	32	32	34	28	32
Latina	22	21	28	14	21
Other	13	15	13	16	8
Parity/recent births			*		
Nulliparous	38	34	47	40	38
Past year birth	11	12	6	8	11
1, no past year birth	24	27	21	28	21
2+, no past year birth	27	27	26	24	30
Gestational age	17.0	19.9	23.4***	19.2***	7.8***
Union status					
Single	63	64	72	62	57
Married	9	8	10	6	11
Cohabiting	17	17	13	16	21
Divorced/separated	10	11	6	16	11
Education					
Less than high school	19	18	24	20	16
High school graduate	33	34	34	26	31
Some college	40	40	36	46	42
College	8	7	6	8	11
Employed	54	54	40**	48	63*
Child abuse/neglect	23	23	21	12*	25
History of depression/anxiety	25	23	21	30	30
Any alcohol use	55	53	48	56	64**
Binge drinking	24	23	24	22	25
Eye-opener or Blackout	6	4	7	10	7

\**P* < 0.05.\*\**P* < 0.01.\*\*\**P* < 0.001, all compared with Near Limit Termination Group.

Figure 1 shows population-average predicted probabilities of any alcohol use and is based on model output. The probability of any alcohol use one week after termination-seeking (when *Turnaway Births* were still pregnant) was 0.44 for *Near Limits* and 0.20 for *Turnaway Births*; by 2.5 years (or 30 months), it was 0.57 for *Near Limits* and 0.45 for *Turnaway Births*. Trends in any alcohol use differed between *First Trimesters* and *Near Limits*, with any alcohol use higher among *First Trimesters* one week after termination-seeking (*P* < 0.001) and increasing less rapidly (*P* = 0.019). There were no statistically significant differences in any alcohol use between *Turnaway No Births* and *Near Limits*. Women returned to—and, in some cases exceeded—the pre-pregnancy recognition level of any drinking between six and 18 months post-termination-seeking, with *Turnaway Births* reaching the pre-pregnancy recognition level later (Fig. 1).

While there were no statistically significant differences in binge drinking prior to pregnancy recognition, *Turnaway Births* had lower odds of binge drinking than *Near Limits* (*P* < 0.001) one week after termination-seeking, when *Turnaway Births* were still pregnant (Table 2 and Fig. 2). Odds of binge drinking among *Near Limits* increased from one week through 30 months (*P* = 0.007), although binge drinking stopped increasing by 12 months. Odds of binge drinking among *Turnaway Births* increased more rapidly than *Near Limits* (*P* = 0.024), with the increase stopping later than for *Near Limits*. Figure 2 shows that the difference in binge drinking between *Near Limits* and *Turnaway Births* narrowed from one week to 30 months after termination-seeking, but did not converge. The probability of binge drinking at one week

(when *Turnaway Births* were still pregnant) was 0.15 for *Near Limits* and 0.04 for *Turnaway Births*; at 2.5 years (or 30 months), the probability was 0.17 for *Near Limits* and 0.12 for *Turnaway Births*. There were no statistically significant differences in binge drinking between *Turnaway No Births* and *Near Limits* or between *First Trimesters* and *Near Limits*. *Near Limits*, *Turnaway Births* and *First Trimesters* did not return to their pre-pregnancy recognition level of binge drinking (Fig. 2). Among *Turnaway No Births*, it was slightly higher at 12 and 18 month interviews. There was no statistically significant change over time in problem symptoms or difference in problem symptoms by study group over time (Table 2).

### Sensitivity analyses

When the data were restricted to recruitment sites with participation rates greater than 50%, there were no substantive differences in study findings, although some comparisons were no longer statistically significant (probably due to reduced sample size). When *Turnaways* who placed their babies for adoption were removed from *Turnaway Births*, findings were again substantively similar.

## DISCUSSION

This study found that women who had a child from an unwanted pregnancy made sustained reductions over two and a half years in any and binge alcohol use, while women who had a pregnancy termination resumed close to pre-pregnancy recognition alcohol use relatively soon

**Table 2.** Longitudinal mixed effects regressions of pregnancy termination and subsequent alcohol use, binge drinking and problem symptoms

	aOR	P-value	95% CI	
<b>Any alcohol use</b>				
Near Limit Termination Group	reference			
Turnaway Births	0.15	<0.001	0.07	0.30
Turnaway No Births	0.69	0.476	0.25	1.90
First Trimester Termination Group	2.68	<0.001	1.55	4.63
Months	1.13	<0.001	1.08	1.17
Turnaway Births × Months	1.15	0.001	1.06	1.26
Turnaway No Births × Months	1.04	0.612	0.90	1.19
First Trimester × Months	0.92	0.019	0.86	0.99
Months <sup>2</sup>	1.00	<0.001	1.00	1.00
Turnaway Births × Months <sup>2</sup>	1.00	0.011	0.99	1.00
Turnaway No Births × Months <sup>2</sup>	1.00	0.870	1.00	1.00
First Trimester × Months <sup>2</sup>	1.00	0.038	1.00	1.00
<b>Binge drinking</b>				
Near Limit Termination Group	reference			
Turnaway Births	0.12	<0.001	0.04	0.34
Turnaway No Births	1.03	0.968	0.29	3.58
First Trimester Termination Group	1.37	0.348	0.71	2.63
Months	1.08	0.007	1.02	1.15
Turnaway Births × Months	1.16	0.024	1.02	1.32
Turnaway No Births × Months	1.05	0.586	0.89	1.24
First Trimester × Months	0.95	0.223	0.87	1.03
Months <sup>2</sup>	1.00	<0.001	1.00	1.00
Turnaway Births × Months <sup>2</sup>	1.00	0.082	0.99	1.00
Turnaway No Births × Months <sup>2</sup>	1.00	0.622	0.99	1.00
First Trimester × Months <sup>2</sup>	1.00	0.265	1.00	1.00
<b>Problem symptoms</b>				
Near Limit Termination Group	reference			
Turnaway Births	0.44	0.255	0.11	1.81
Turnaway No Births	3.30	0.149	0.65	16.67
First Trimester Abortion Group	1.28	0.616	0.49	3.34
Months	1.08	0.172	0.97	1.19
Turnaway Births × Months	0.91	0.376	0.75	1.12
Turnaway No Births × Months	0.84	0.176	0.65	1.08
First Trimester × Months	0.98	0.820	0.86	1.13
Months <sup>2</sup>	0.99	<0.001	0.99	0.99
Turnaway Births × Months <sup>2</sup>	1.00	0.256	1.00	1.01
Turnaway No Births × Months <sup>2</sup>	1.01	0.192	1.00	1.02
First Trimester × Months <sup>2</sup>	1.00	0.803	1.00	1.01

All models controlled for age, race, parity, union status, education, employment, child abuse/neglect and depression/anxiety history.

after the termination. This finding confirms previous research that has found that women who have a pregnancy termination are more likely to consume alcohol subsequent to the pregnancy than women who have a live birth. Findings from this study, however, indicate that this difference is due primarily to cessation/reduction in alcohol consumption among women continuing pregnancies rather than increases among women having terminations.

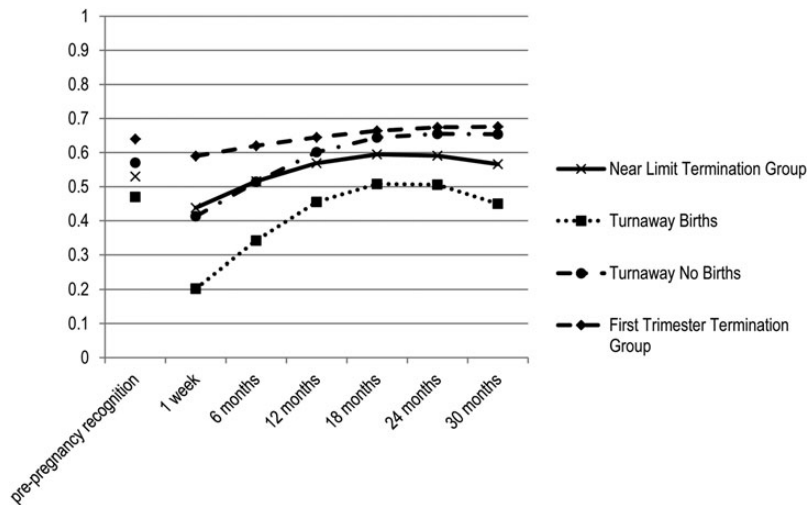
These findings have implications for three literatures. First, in relation to pregnancy termination and subsequent alcohol use, we found no evidence that having a termination led to increasing risky or problematic drinking over time. Although we confirmed findings of more alcohol consumption among women who have had a termination (Major *et al.*, 2009; Steinberg and Finer, 2011), our results show no evidence

that having a termination causes women to start binge drinking to cope. Notably, the proportion reporting binge drinking prior to pregnancy recognition among women who had terminations was between one and one and a half times that of women of childbearing age in the US (SAMHSA, 2011; CDC, 2012). The higher proportion reporting binge drinking in our sample is most likely due to the over-representation of women 20–24 (who binge drink more) and under-representation of women 35–46 (who binge drink less) (CDC, 2010) in our sample and among abortion patients more generally (Jones *et al.*, 2010), compared with the age distribution of women of reproductive age in the US (U.S. Census, 2010). If women sustain binge drinking, they may be at risk of health-related problems and consequences such as alcohol-impaired driving, injury, depression and sexual assault (Cherpitel *et al.*, 2003; Flowers *et al.*, 2008; Howard *et al.*, 2008; Paljarvi *et al.*, 2009).

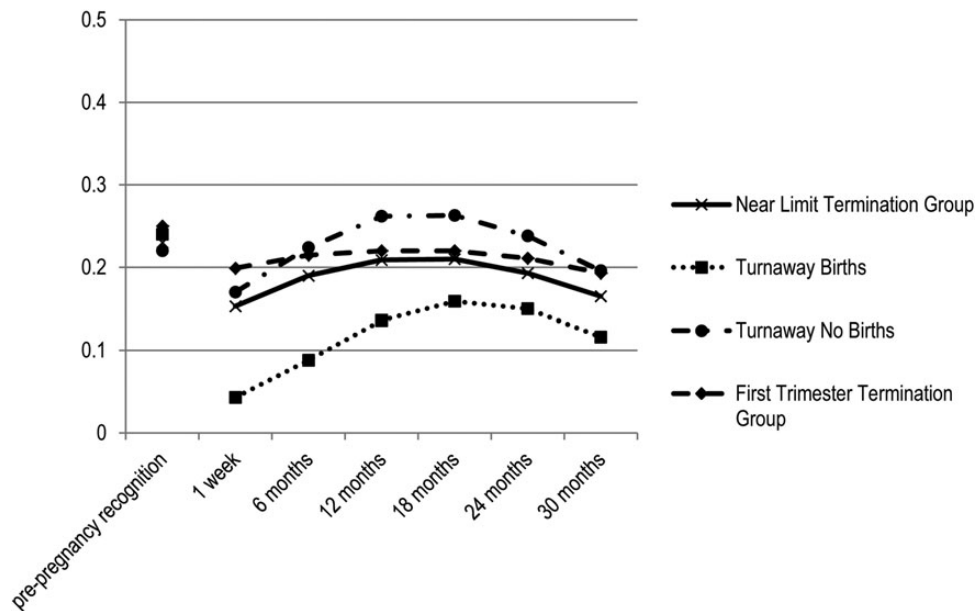
Second, women who have a child from an unwanted pregnancy appear to demonstrate similar cessation/resumption patterns to other pregnant and parenting women—including resuming use beginning in the early post-partum period and increasing over this period (Little *et al.*, 1990b; Alvik *et al.*, 2006b; Giglia and Binns, 2007; Bailey *et al.*, 2008). This finding suggests that—for any and binge drinking—the obligations and roles of pregnancy and parenting, rather than self-selection into parenthood, lead to cessation during pregnancy and postpartum. It is important to note that we did not find statistically significant differences in having an alcohol-related problem symptom over time between women having a termination versus having a child from the unwanted pregnancy, meaning that the pregnancy and parenting-related cessation and resumption pattern did not apply to problem symptoms. Thus, pregnancy and parenting may not exert the same dampening influence on women experiencing problem symptoms. It is also possible, though, that our sample was not large enough to detect a difference in this less common outcome.

Third, some women who had a child from the unwanted pregnancy continued binge drinking and continued having problem symptoms during pregnancy. As heavier alcohol use during pregnancy has clearly documented health effects (Russell and Skinner, 1988; Sokol *et al.*, 2003, May *et al.*, 2008), acceptable and effective interventions for women who want—but are unable—to terminate pregnancies need to be developed. We have noted previously (Roberts *et al.*, 2014b) that, as women denied terminations are women who have already consumed heavier levels of alcohol during pregnancy, public health messages emphasizing no safe level of alcohol use during pregnancy are not relevant or appropriate for this population.

There are some limitations. First, *Near Limits* (our main termination group of interest) received terminations later in gestation than is typical in the US (Pazol *et al.*, 2012) and globally (Kapp and von Hertzen, 2009). If experiences subsequent to later terminations differ from first trimester terminations, findings may not generalize. There were no statistically significant differences in binge drinking or problem symptoms between *First Trimesters* and *Near Limits*, suggesting that experiences after later terminations may not differ from more typical experiences. We do note the difference in any alcohol use between the two groups; however, this difference appears due to more *First Trimester* women consuming any alcohol before pregnancy recognition and having this pre-existing difference remain. Second, 37.5% of eligible participants consented to participate in this study. Importantly, nonparticipation was unrelated to the exposure (receiving versus being denied termination). Also, in sensitivity analyses restricted to sites with higher participation, we found no substantive differences from main findings. Prospective cohort studies that are lengthy and offer no direct benefit often have low participation (Rothman *et al.*, 2008; Ejiogu *et al.*, 2011). In our case, this challenge



**Fig. 1.** Any drinking subsequent to pregnancy termination-seeking. Pre-pregnancy recognition refers to the proportion reporting any drinking prior to pregnancy recognition; this time point was not included in the longitudinal model and is shown here for reference purposes only.



**Fig. 2.** Pre-pregnancy recognition refers to the proportion reporting binge drinking prior to pregnancy recognition; this time point was not included in the longitudinal model and is shown here for reference purposes only.

may have been compounded by the fact that our study examined effects of a stigmatized health service and required semi-annual interviews over five years. It is worth noting, though, that a recent review found that almost two-thirds of prospective cohort studies fail to report participation information (Morton *et al.*, 2006). This suggests that published participation rates may suffer from reporting bias, where lower participation rates are less likely to be reported (Galea and Tracy, 2007). Another potential limitation is that there may be a relationship between any pre-pregnancy recognition alcohol use and participation in follow-up interviews. The maximum likelihood methods we used to fit the regression models provide consistent estimation of parameters of interest in settings where data are missing

at random (Little and Rubin, 2002). There is no way to know to what extent this is the case here.

Alcohol measures are another limitation. First, all alcohol use measures are self-report and thus may be under-reported especially by women who were pregnant at the time of an interview. Second, any alcohol use was one outcome we examined. Unlike binge drinking and problem symptoms, use of any alcohol among non-pregnant women in the general population is not typically considered a health concern. Further, there were no usual quantity or frequency measures; thus, calculating volume or identifying heavy drinkers who do not binge or have a problem symptom is impossible. This is even more significant given that the binge threshold in this study was >5 rather than

a traditional 5+ (5 or more drinks) or current 4+ for women (Wechsler *et al.*, 1995; NIAAA, 2004). Finally, only two problem indicators (eye-opener and blackout) were included. Despite these limitations, alcohol questions in this unique dataset are adequate to begin to describe effects on women's alcohol use of terminating versus having a child from an unwanted pregnancy.

This study also has strengths. First, it used a comparison group for women who have a pregnancy termination that represents what their experiences would have been had they not been able to terminate. Also, using women denied terminations as the comparison group allowed an examination of whether parenting-related reductions in alcohol consumption are due to roles and obligations of parenting or to characteristics of women selecting a parenting-role. Second, it did not rely on retrospective self-report of pregnancy termination, thereby avoiding social desirability bias. Third, by measuring alcohol consumption over time as opposed to at only one time point subsequent to termination-seeking, we were able to examine whether subsequent differences were due to changes among women having terminations or among women having children from unwanted pregnancies.

While more women who had a termination than women who had a child from an unwanted pregnancy reported any and binge alcohol use subsequent to termination-seeking, this difference was due to a reduction in alcohol consumption among women having the child rather than an increase in consumption among women having a termination. Thus, assertions that having a termination leads women to increase alcohol use to cope with having had a termination were not supported. Women who have a child from an unwanted pregnancy report similar cessation/resumption patterns to other pregnant and parenting women.

## ACKNOWLEDGEMENT

The authors thank Rana Barar, Heather Gould and Sandy Stonesifer for study coordination and management; Janine Carpenter, Undine Darney, Ivette Gomez, Selena Phipps, Claire Schreiber and Danielle Sinkford for conducting interviews; Michaela Ferrari, Elisette Weiss and Debbie Nguyen for project support and Jay Fraser for database assistance.

## FUNDING

Components of this study were funded by the Wallace Alexander Gerbode Foundation, the William and Flora Hewlett Foundation, the David and Lucile Packard Foundation, the U.S. National Institute on Alcohol Abuse and Alcoholism/National Institutes of Health (Grant R21 AA021440) and an anonymous foundation.

## CONFLICT OF INTEREST STATEMENT

None declared.

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